

Fig. 1

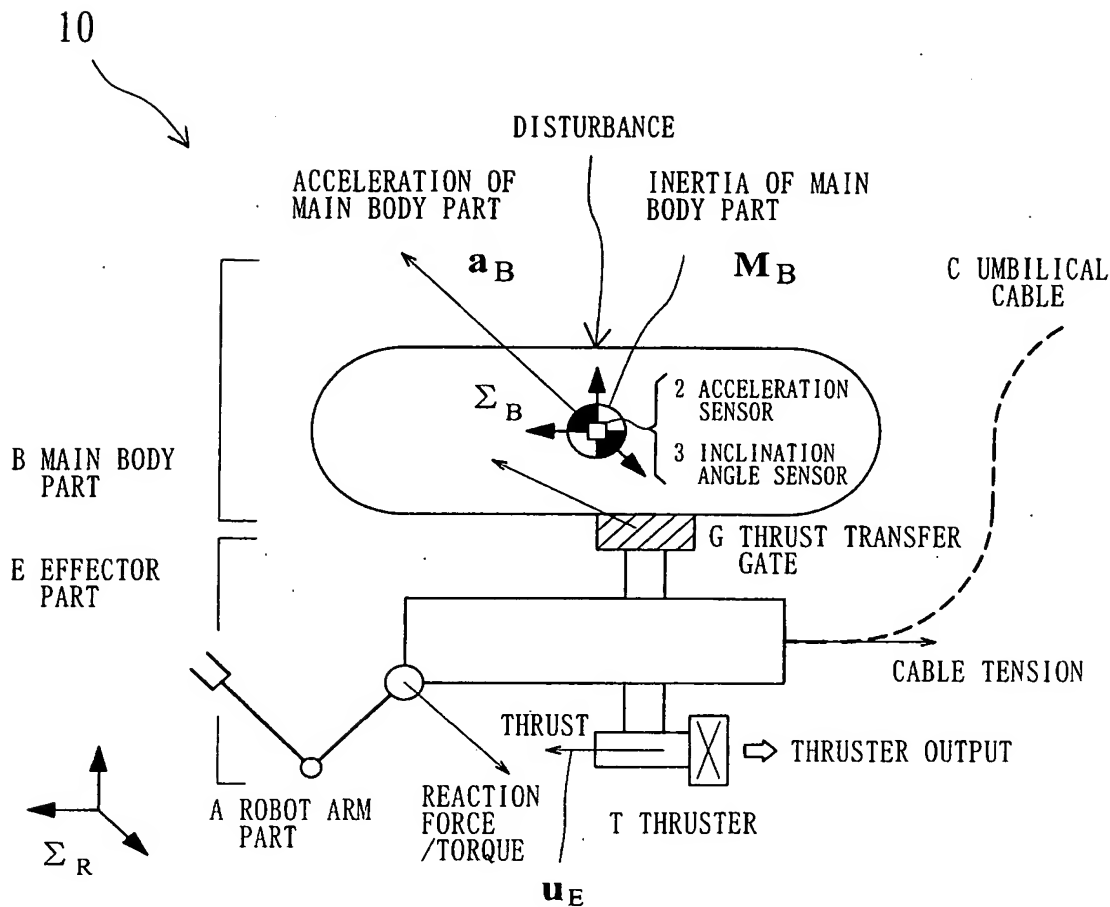


Fig. 2

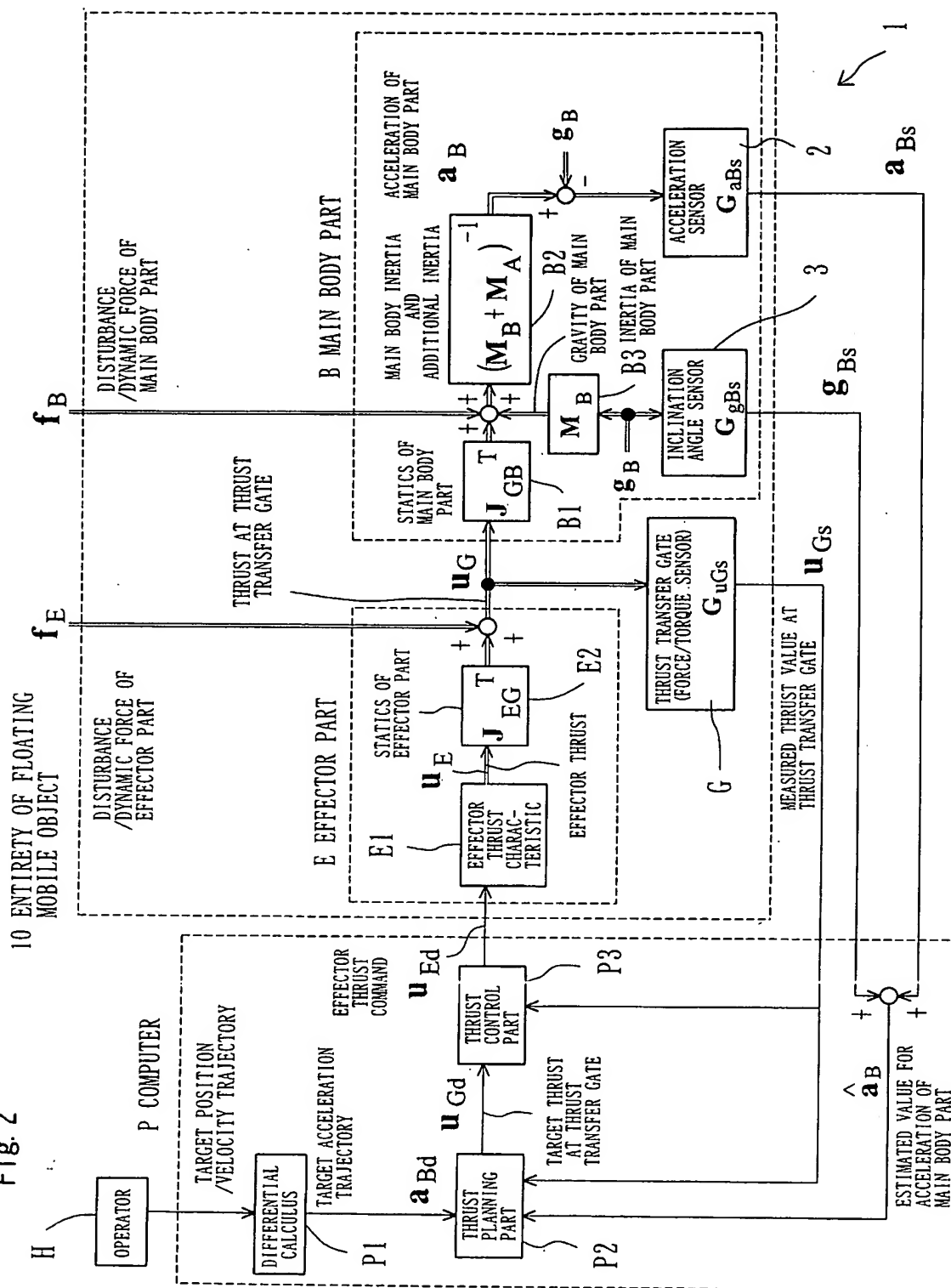
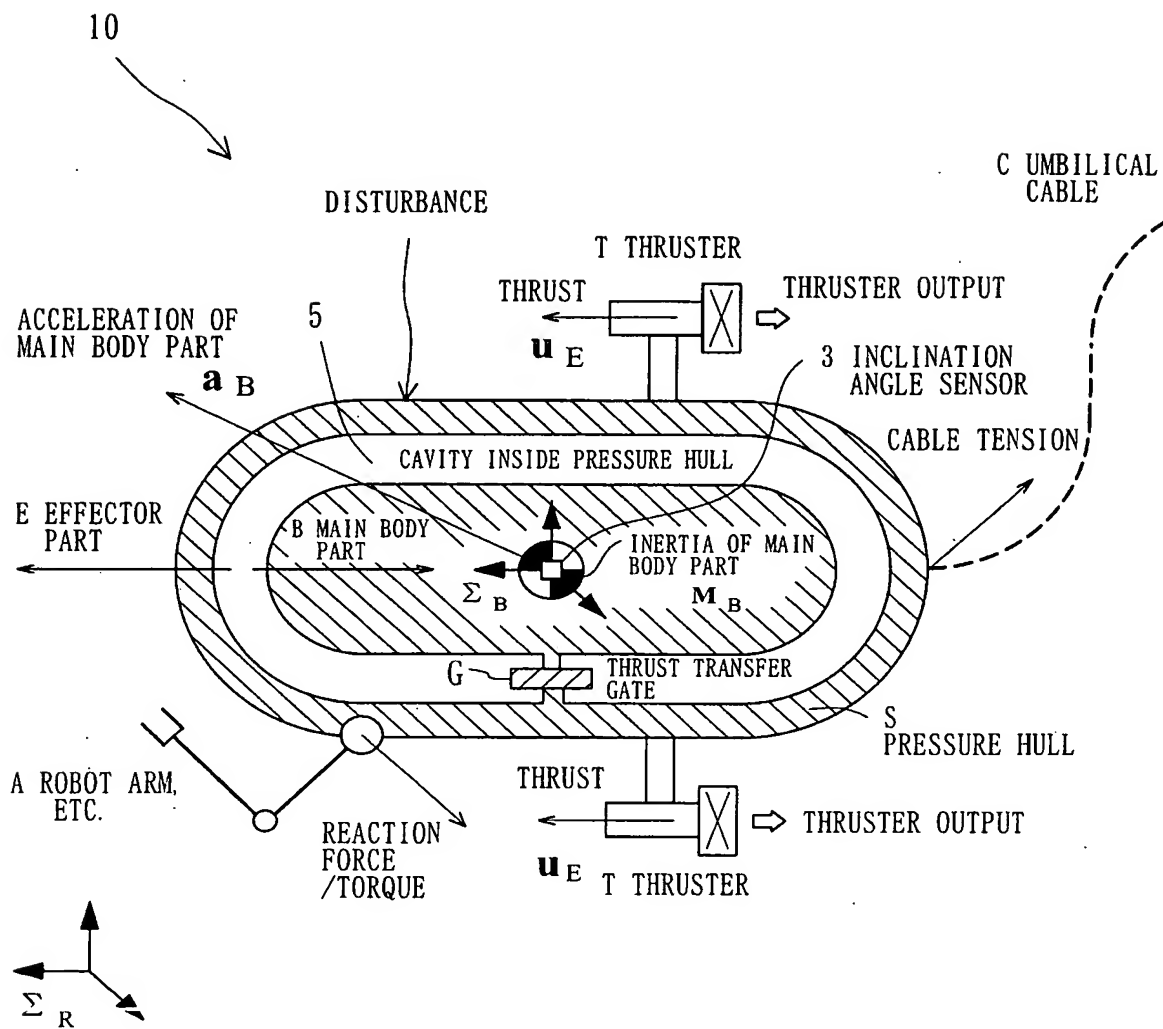


Fig. 3



Title: CONTROL SYSTEM OF FLOATING MOBILE BODY

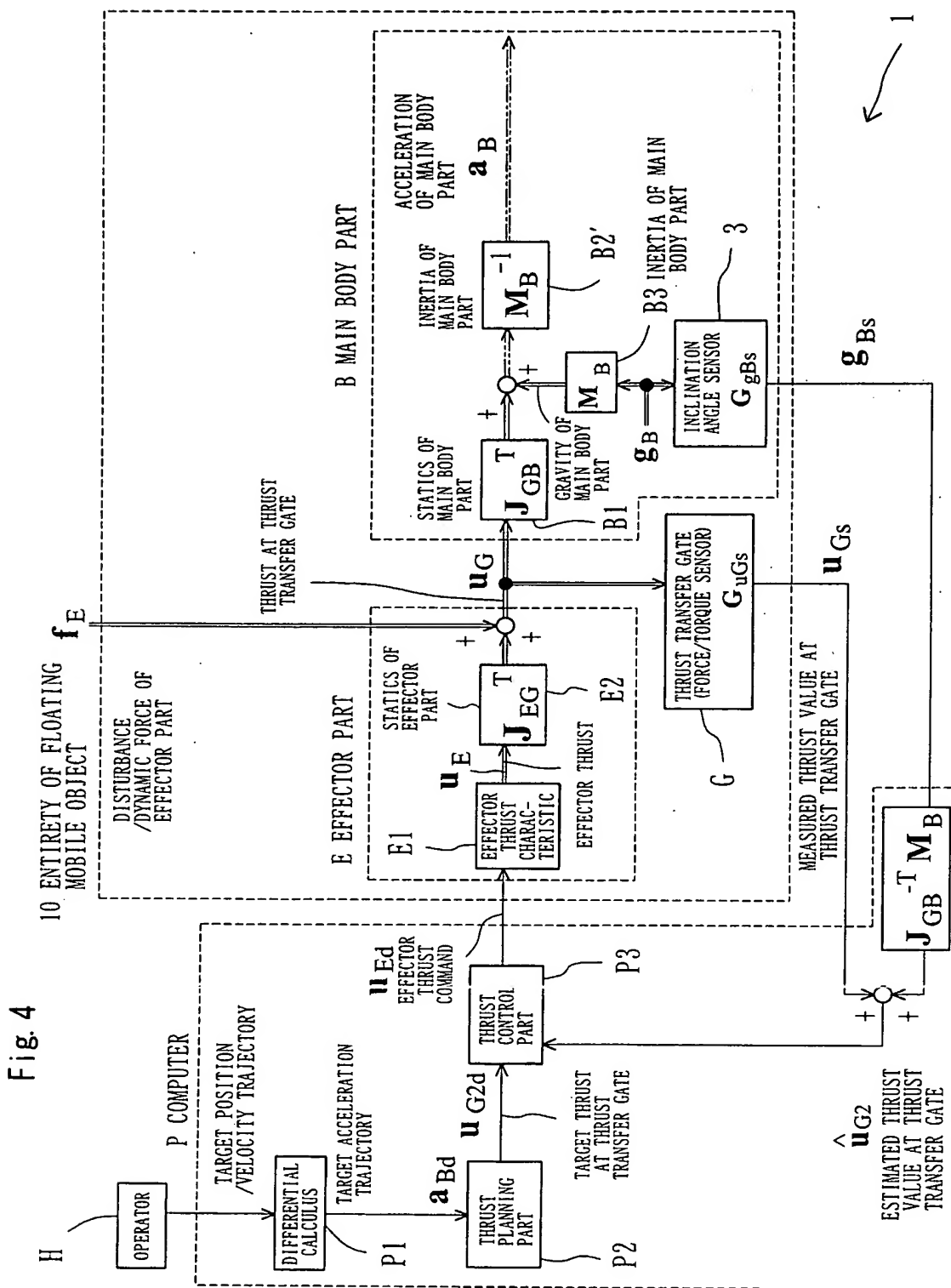


Fig. 5

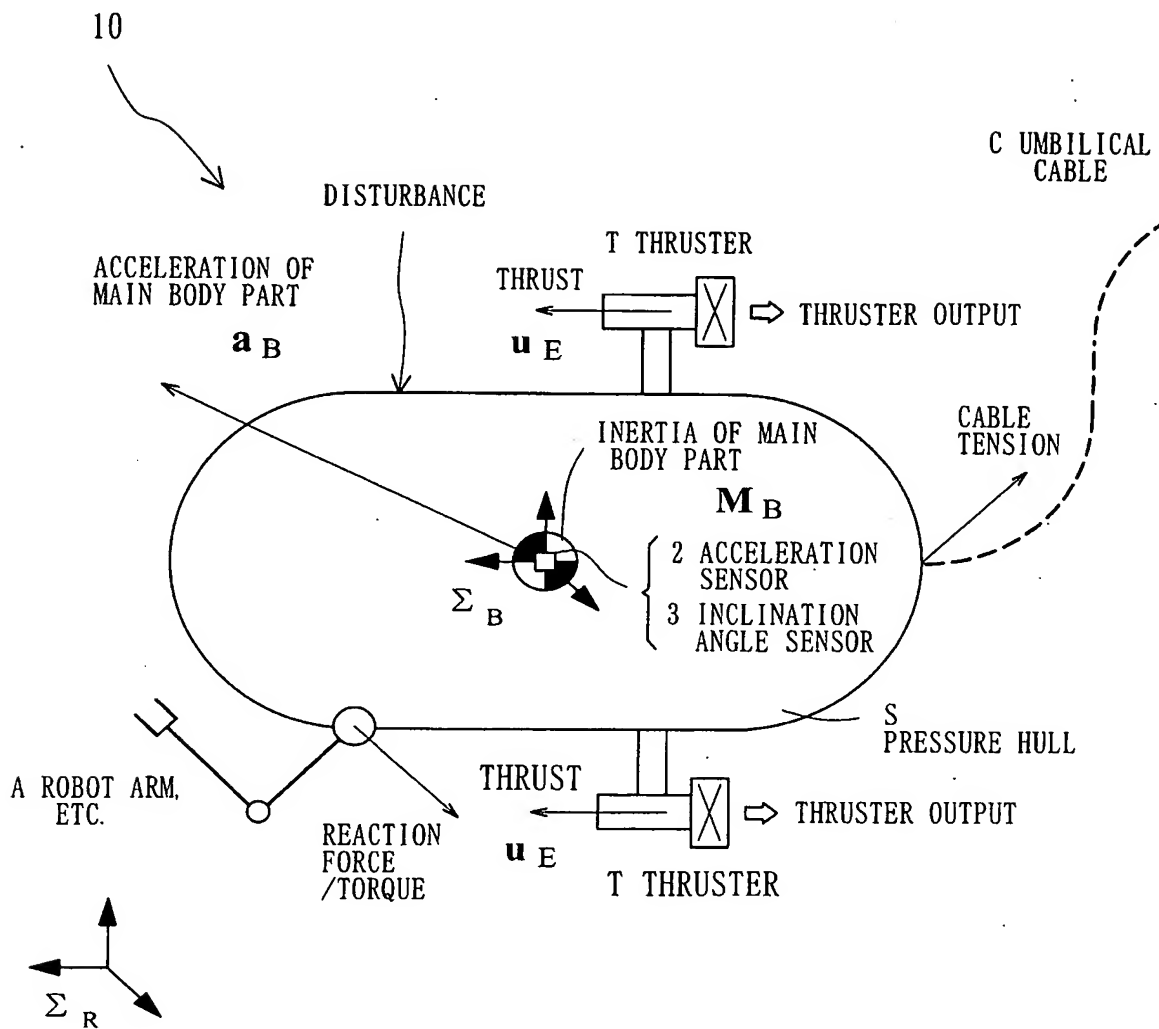


Fig. 6

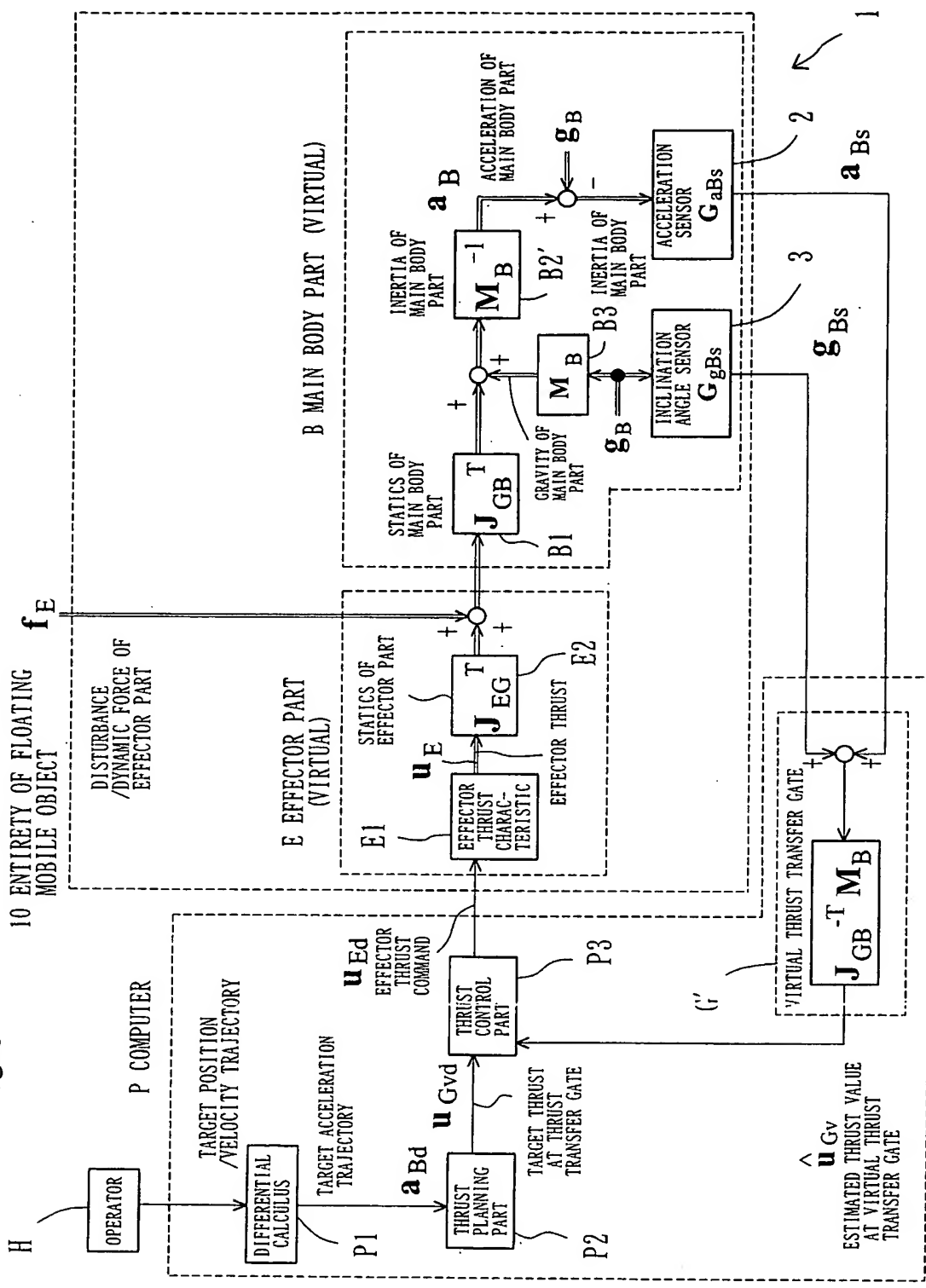
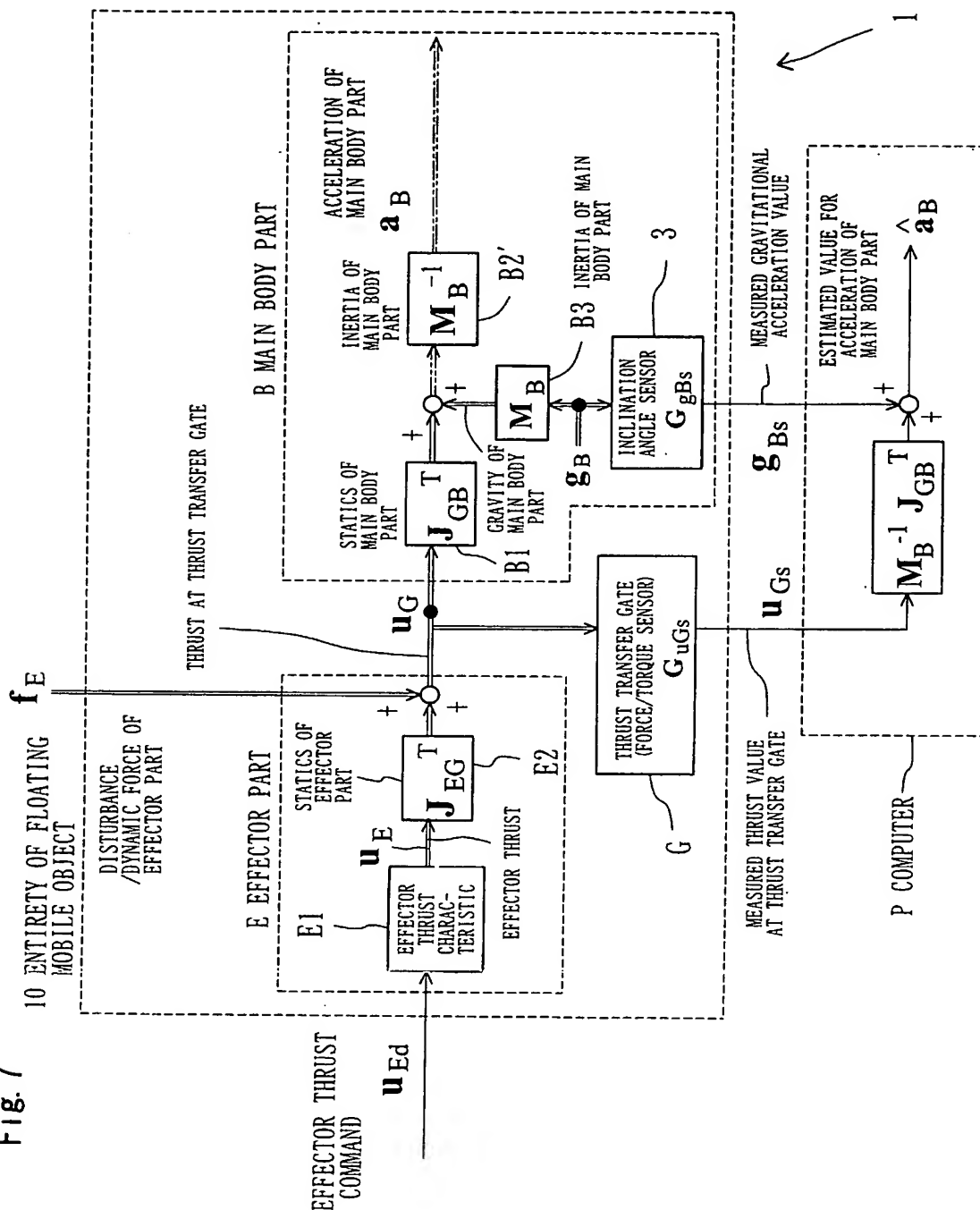


Fig. 7



The diagram illustrates a control system for a floating mobile object, divided into three main functional areas: the P Computer, the E Effector Part, and the B Main Body Part.

P Computer: This section includes an **Operator** and a **Differential Calculus** block. The Operator provides input to the Position Control block. The Differential Calculus block receives target position/velocity and target acceleration trajectories, outputting a_{Bd} to the Thrust Planning Part.

E Effector Part: This section contains the **Thrust Planning Part** (P2), **Thrust Control Part** (P3), and **Thrust Transfer Gate** (G). The Thrust Planning Part receives a_{Bd} and the estimated acceleration \hat{a}_B to produce the target thrust u_{Gd} . The Thrust Control Part receives u_{Gd} and the effector thrust characteristic u_E to produce the effector thrust u_E . The Thrust Transfer Gate (G) receives u_E and the measured thrust value u_{Gs} to produce the effector thrust u_E .

B Main Body Part: This section contains the **Statics of Main Body Part** (J_{GB}), **Inertia of Main Body Part** (M_B), **Gravity of Main Body Part** (g_B), **Inertia of Main Body Part** (M_B), **Acceleration Sensor** (G_{aBs}), **Inclination Angle Sensor** (G_{gBs}), and **Position/Velocity of Main Body Part** (B4). The Statics block (J_{GB}) receives the effector thrust u_E and the measured thrust value u_{Gs} to produce the acceleration a_B . The Inertia block (M_B) receives a_B and the gravity g_B to produce the velocity v_B . The Gravity block (g_B) receives the inclination angle θ_B to produce the gravity g_B . The Inertia block (M_B) also receives the velocity v_B to produce the position p_B . The Acceleration Sensor (G_{aBs}) and Inclination Angle Sensor (G_{gBs}) provide feedback signals a_{Bs} and g_{Bs} to the control system.

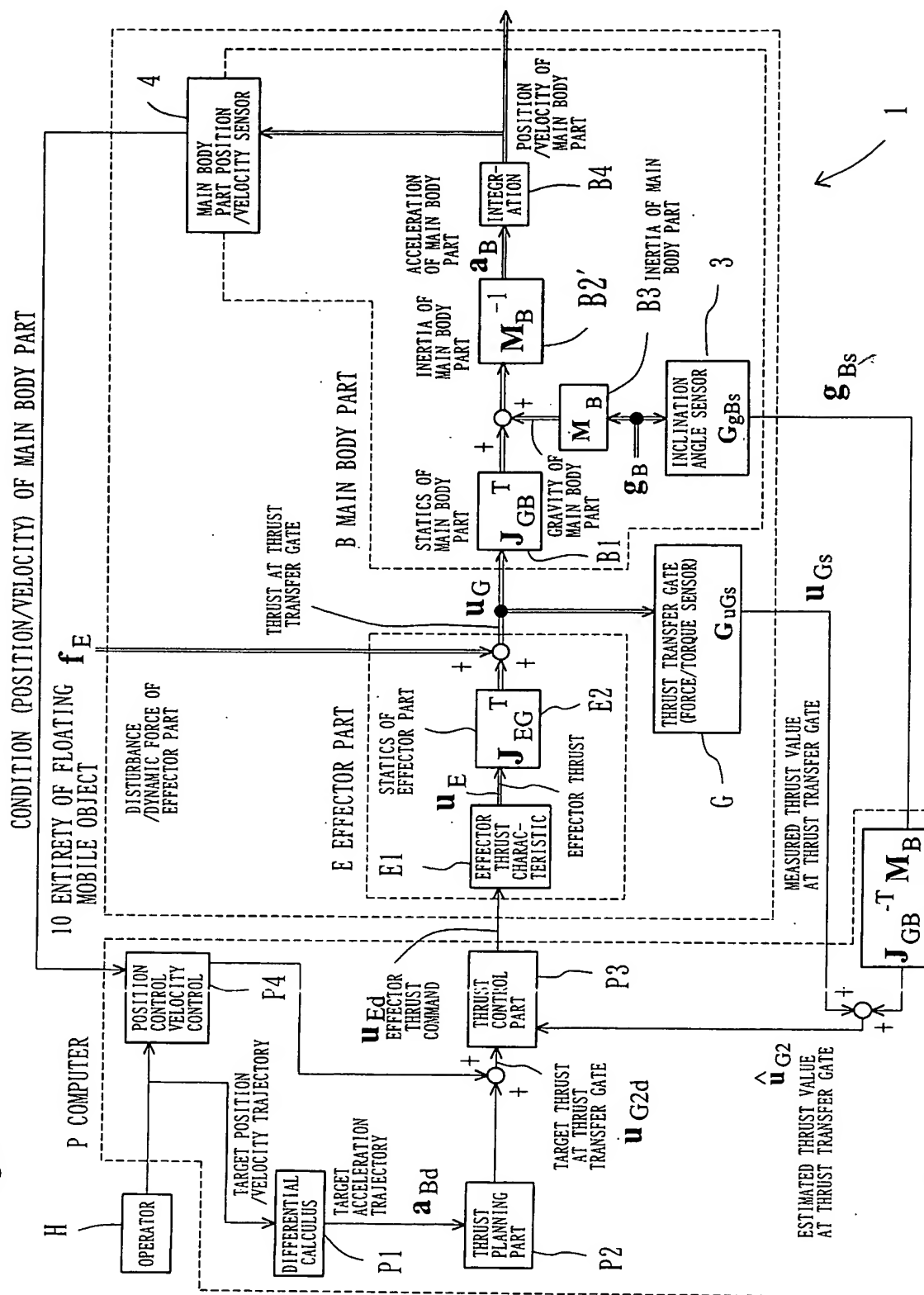
Disturbance/Dynamic Force of Main Body Part: This block (f_B) receives the disturbance/dynamic force f_B and the position/velocity p_B to produce the acceleration a_B .

Position/Velocity of Main Body Part: This block (B4) receives the position/velocity p_B and the acceleration a_B to produce the position/velocity p_B .

Estimated Value for Acceleration of Main Body Part: This block (\hat{a}_B) receives the acceleration a_B and the measured thrust value u_{Gs} to produce the estimated acceleration \hat{a}_B .

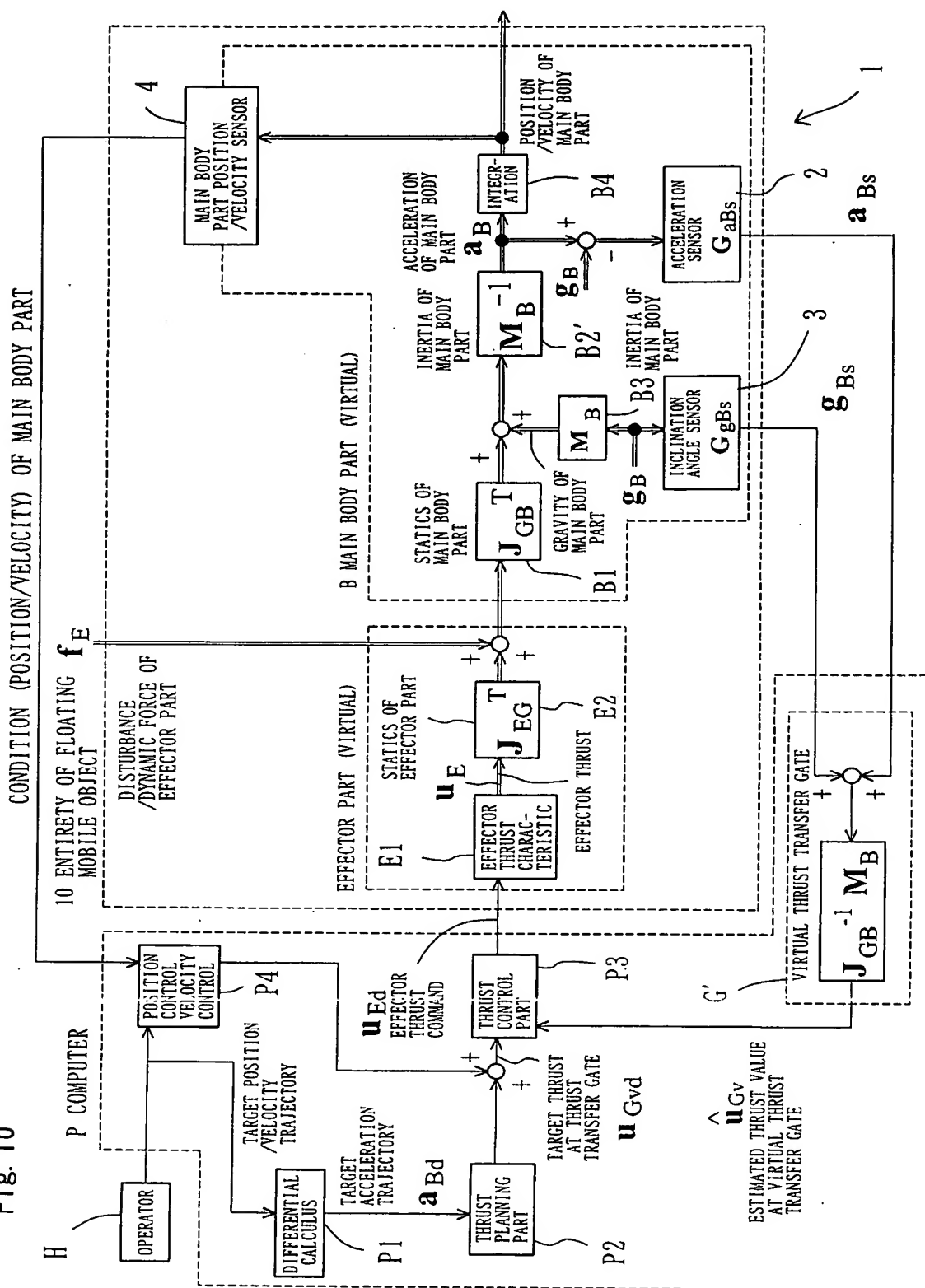
Title: CONTROL SYSTEM OF FLOATING MOBILE BODY

Fig. 9



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Fig. 10



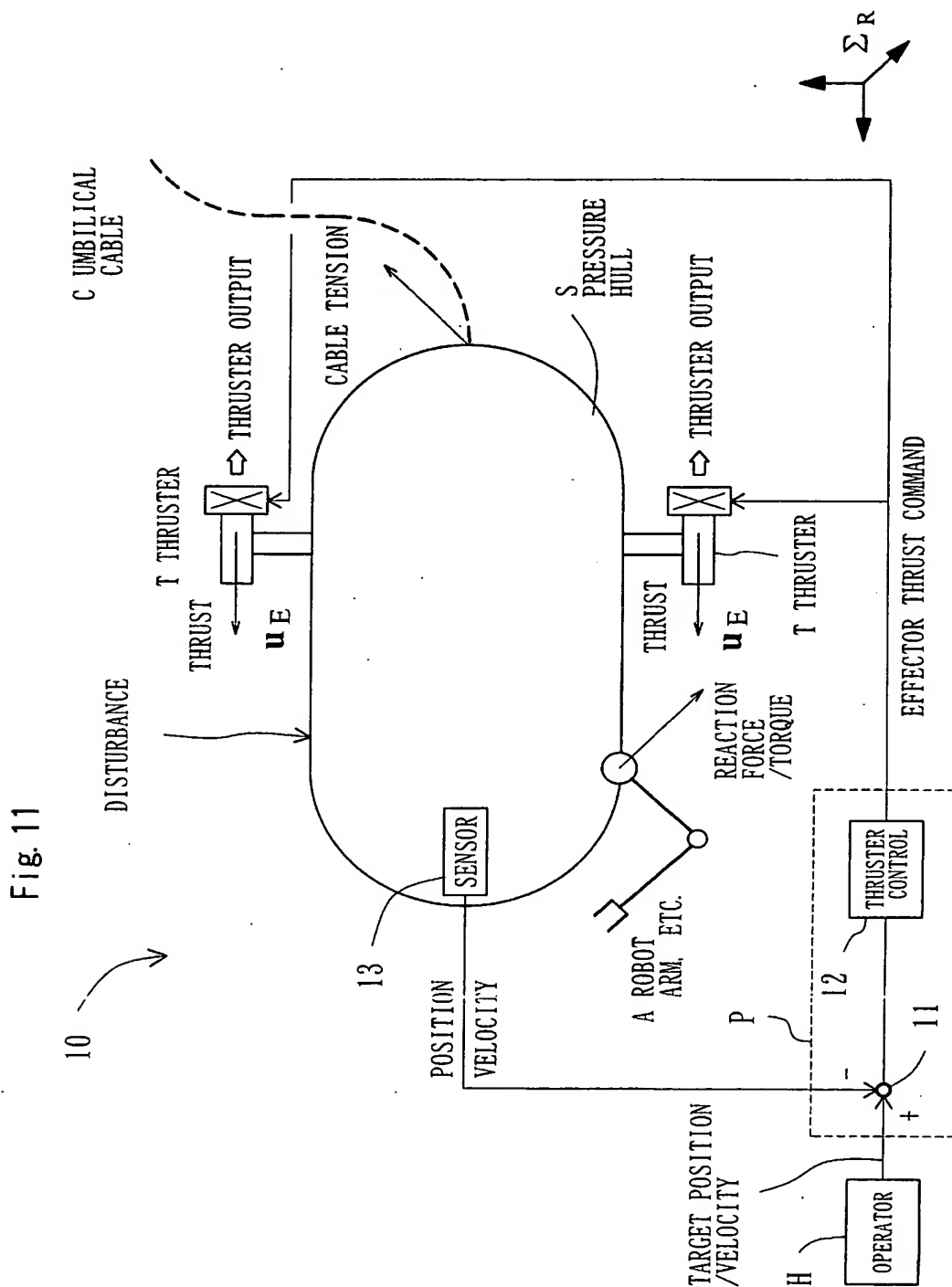


Fig. 12

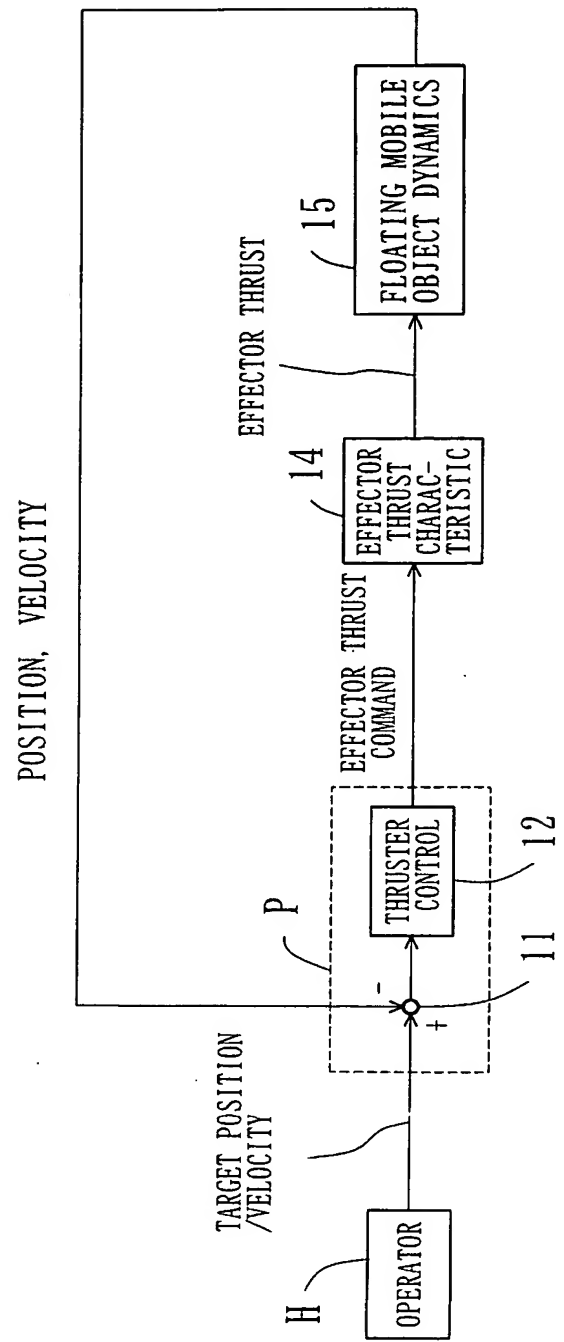
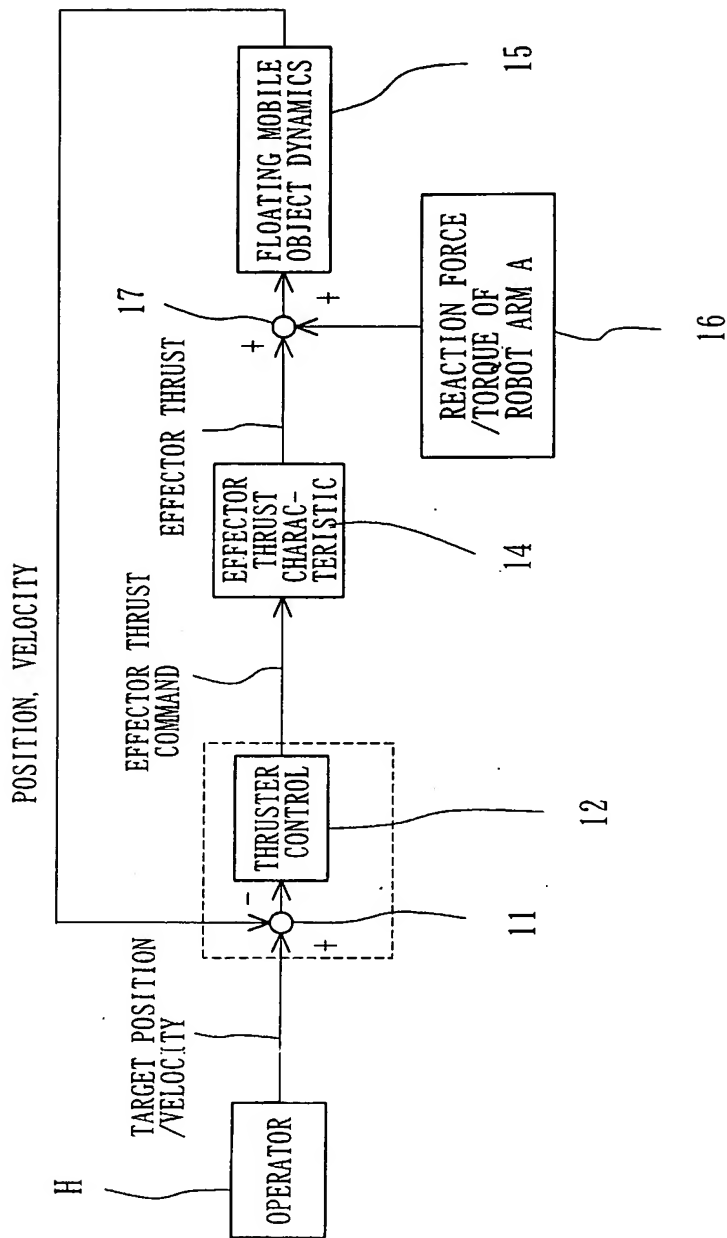


Fig. 13



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Fig. 14

